REMARKS

Claims 1, 8, 12, 13, 14, 17, 19, 20, 26, 30, and 33 been amended and claims 2-3, 29, and 36-47 have been cancelled. Accordingly, claims 1, 4-28, and 30-35 remain pending.

The Examiner has objected to disclosure because of an informality. Specifically, the specification requires an application number in several places. The application number has been provided in the amendment submitted herein.

The Examiner has objected to claims 12, 17, and 30 for various informalities, which have been corrected herein.

The Examiner has rejected claims 14, 36, and 15-19 under 35 U.S.C. §112, second paragraph, as being indefinite. Claim 36 is cancelled. The Examiner states that Claim 14 mentions "a second signal representation" and it is not disclosed as to where the signal is generated. Claim 14 has been amended to clarify that this signal is obtained from a reference wafer portion, for example, from a reference die on the same or a different wafer.

The Examiner has stated that claims 5, 12, 19, 32, and 35 would be allowable if rewritten into independent form to include all the limitations of the base claim and any intervening claims.

The Examiner has rejected claims 20-31, 33, and 34 under 35 U.S.C. §102(b) as being anticipated by Wihl et al. (U.S. patent 5,572,598). The Examiner has also rejected claim 1, 7, 36-40, and 45-47 under 35 U.S.C. §103(a) as being unpatentable over Rostvall (US 5,583,639). Claims 2-4, 6, 8-11, 13, 41, and 44 are rejected under 35 U.S.C. §103(a) as being unpatentable over Rostvall and further in view of Wihl. Claims 5 and 12 are rejected under 35 U.S.C. §103(a) as being unpatentable over Rostvall and further in view of Ai et al. (US 5,471,303). Claims 14, 15, 17, and 18 are rejected under 35 U.S.C. §103(a) as being unpatentable over Wihl. The Examiner's rejections are respectfully traversed as follows.

Claim 1 is directed towards an "integrated interferometric microscopic inspection system for inspecting semiconductor wafers. Claim 1 also requires "an illumination module configured to generate a first illumination beam for interferometric inspection in a first mode and a second illumination beam for intensity based microscopic inspection in a second mode" and "an integrated interferometric microscope module configured for both inteferometric and intensity based microscopic inspection, in the interferometric inspection mode for splitting the first illumination beam into a test beam directed to the semiconductor wafer and a reference beam towards a reference mirror, and combining the test beam reflected from the wafer and the

reference beam reflected from the reference mirror to form an interference image and to reflect the second illumination beam from the wafer." Claim 1 also recites "at least one image sensor configured to receive the interference image and the reflected second illumination beam from the integrated interferometric microscope module." Claim 1 further includes "a processing module configured to (i) reconstruct complex field information from the interference image of a first portion of the wafer, (ii) generate a first signal representation of the first portion of the wafer using the reconstructed complex field information, (iii) measure an intensity of the second illumination beam reflected from the first portion of the wafer using microscopic techniques to generate a third signal representation, (iv) compare the first signal representation and the third signal representation to a second signal representation of a wafer to generate a resultant signal representation, and (v) use the resultant signal representation to identify defects in the first portion of the wafer. In other words, a signal that is generated from an interference image and a second signal that is generated from the intensity of a reflected beam from a same wafer portion are compared to generate a resultant signal that is then used to identify defects in the same wafer portion. That is, two signals from the same wafer portion are compared. Claim 14 has similar limitations regarding such comparison process. Specifically, claim 14 requires generating a first and second signal representation from a first wafer portion, "comparing the first signal representation and the third signal representation to a second signal representation obtained from a reference wafer portion to generate a resultant signal representation" and "using the resultant signal representation to identify defects in the first portion of the wafer."

The primary references Rostvall and Wihl fail to teach or suggest such comparison mechanisms. Although Rostvall appears to teach using a reference mirror to create an interference signal and also reflecting a beam from a wafer portion, the specification does not teach comparing these two signals to a reference signal to generate a resultant signal that is then used to identify defects (or mechanisms for doing the same), in the manner claimed. The Examiner cites Wihl at Col. 4, Lines 41-51 as teaching comparing three signals (interference, intensity, and reference). However, it is respectfully submitted that this section merely teaches comparing each separate signal (obtained from either the interference or reflected beam) to a reference signal. Wihl fails to teach or suggest teach comparing two signals (obtained from an interference image and a reflected beam) to a reference signal to generate a resultant signal that is then used to identify defects (or mechanisms for doing the same), in the manner claimed. Thus, it is submitted that claims 1 and 14 are patentable over Rostavall and Wihl.

Claim 20 is directed towards a "method for performing interferometric inspection." Claim 20 also recites "directing an illumination beam through an interferometric microscope to a semiconductor wafer, the illumination beam being split into a test beam and a reference beam in the interferometric microscope" and "combining the reference beam reflected from a reference mirror and the test beam reflected from the wafer to generate an interference image having spatial fringes on a time delay integration mode sensor, wherein the reference mirror is adjustably tilted so as to maintain a constant optical path difference between the test beam and the reference beam for a selected portion of the interference image pertaining to a corresponding portion of the wafer."

In contrast, Wihl merely teaches tilting a reference mirror in order to produce fringes. See Col. 11, lines 33-37 (emphasis added): "A perfectly flat surface, such as 173 at the top of 162, parallel to the plane of the mask and with an optical path length L will produce fringes as the mask is scanned because, due to the titled mirror 118." However, it is respectfully submitted that Wihl fails to teach or suggest that the "the reference mirror is adjustably tilted so as to maintain a constant optical path difference between the test beam and the reference beam for a selected portion of the interference image pertaining to a corresponding portion of the wafer." Thus, it is submitted that claim 20 is patentable over Wihl.

Claim 26 is directed towards an "interferometric inspection apparatus." Claim 26 also requires "an illumination module configured to generate a first illumination beam for interferometric inspection" and "an interferometric microscope configured to split the illumination beam into a test beam and a reference beam respectively directed to and reflected from a wafer and a reference mirror and to combine the test and reference beams into an interference image having spatial fringe patterns." Claim 26 further requires "at least one time delay integration mode sensor configured to receive the interference image" and a movable stage to support the wafer and to induce movement of the interference image relative to the sensor. Claim 26 further recites "a processing module operable to induce movement with the movable stage so as to align the spatial fringes on the sensor in the direction of the induced movement."

The Examiner cites the reference Wihl as teaching (see. Col. 10, lines 26-36) with respect to original claim 29. However, it is respectfully submitted that this section of Wihl merely teaches moving the stage in a serpentine pattern to obtain data and fails to teach inducing movement with the movable stage so as to align the spatial fringes on the sensor in the direction of the induced movement, in the manner claimed. Thus, it is submitted that claim 26 is patentable over Wihl.

Claim 30 is directed towards a "interferometric inspection system for inspecting semiconductor wafers." Claim 30 also requires "an interferometric microscope module configured for splitting ~~the~~ an illumination beam into a test beam directed to the semiconductor wafer and a reference beam towards a reference mirror, and combining into a combined beam the test beam reflected from the wafer and the reference beam reflected from the reference mirror, the combined beam forming an interference image, wherein the reference mirror is configured to be adjustably tilted with respect to the incident reference beam to generate fringes in the interference image having an orientation different from a dominant direction of a repeating pattern on the wafer" and "an image sensor configured to receive the interference image and to generate a signal for deriving phase information." Claim 33 is directed towards a method that includes "wherein the reference mirror is adjusted with respect to the incident reference beam to generate fringes in the interference image having an orientation different from a dominant direction of a repeating pattern on the wafer."

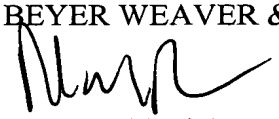
Although the cited reference Wihl appears to teach tilting of a reference mirror to generate fringes, it is respectfully submitted that Wihl fails to teach or suggest mechanisms for adjusting the mirror's tilt so as to generate fringes in the interference image having an orientation different from a dominant direction of a repeating pattern on the wafer, in the manner claimed. Thus, it is submitted that claims 30 and 33 are patentable over Wihl.

The Examiner's rejections of the dependent claims are also respectfully traversed. However, to expedite prosecution, all of these claims will not be argued separately. Claims 4-13, 15-19, 21-25, 27-28, 31-32, and 34-35 each depend directly or indirectly from independent claims 1, 14, 20, 26, 30, or 33 and, therefore, are respectfully submitted to be patentable over cited art for at least the reasons set forth above with respect to claims 1, 14, 20, 26, 30, or 33.

Further, the dependent claims require additional elements that when considered in context of the claimed inventions further patentably distinguish the invention from the cited art.

Applicant believes that all pending claims are allowable and respectfully requests a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

Respectfully submitted,
BEYER WEAVER & THOMAS, LLP



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